KDI Precision Products, Inc.

An ISO 9001 Registered Company

45th Annual Fuze Conference

"The Evolving Nature of Value Added Fuzing"

NDIA

NATIONAL DEFENSE INDUSTRIAL ASSOCIATION

Presented by: Mr Ted Lewis

www.kdi-ppi.com

Report Documentation Page

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Abstract

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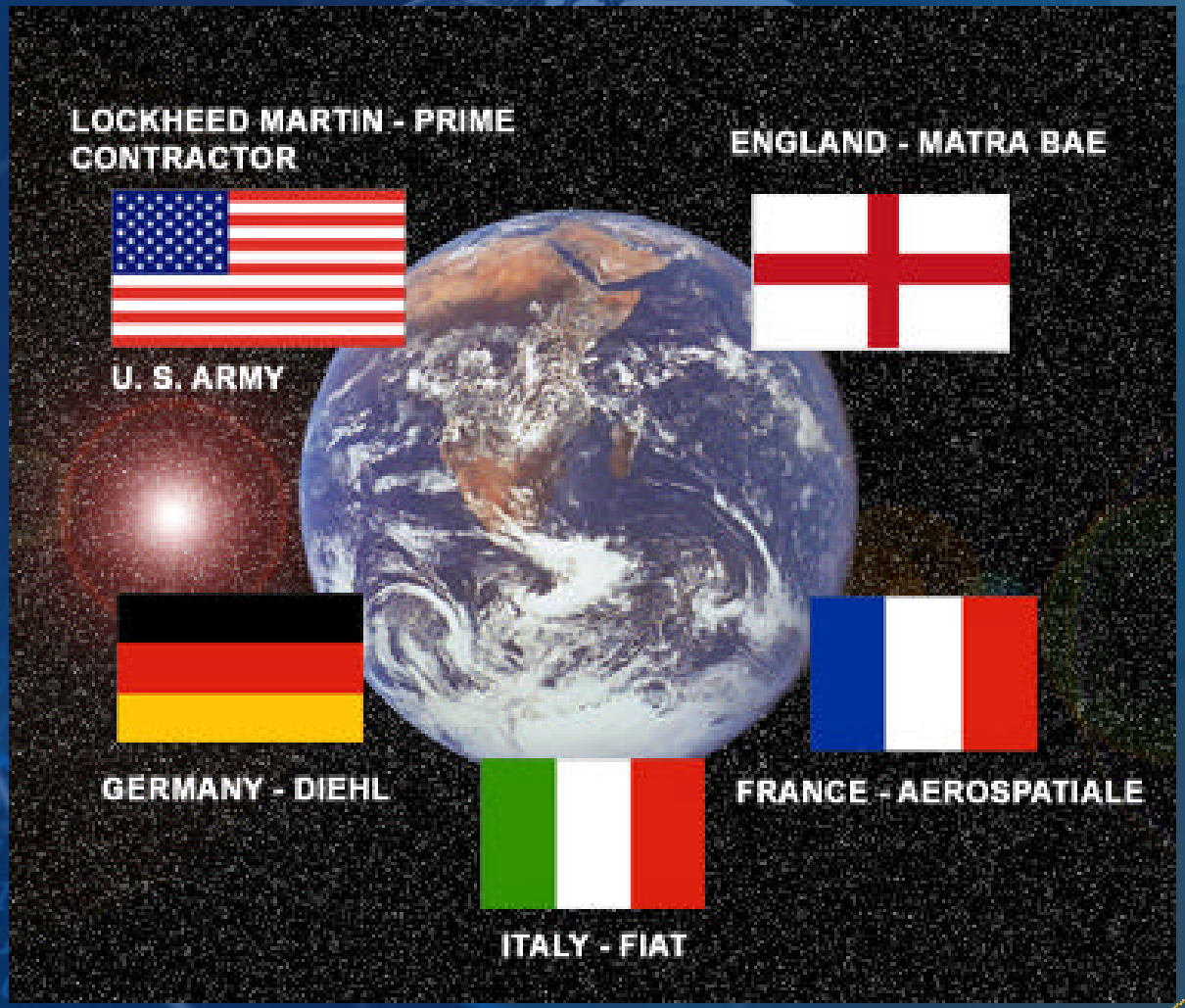
Number of Pages
19

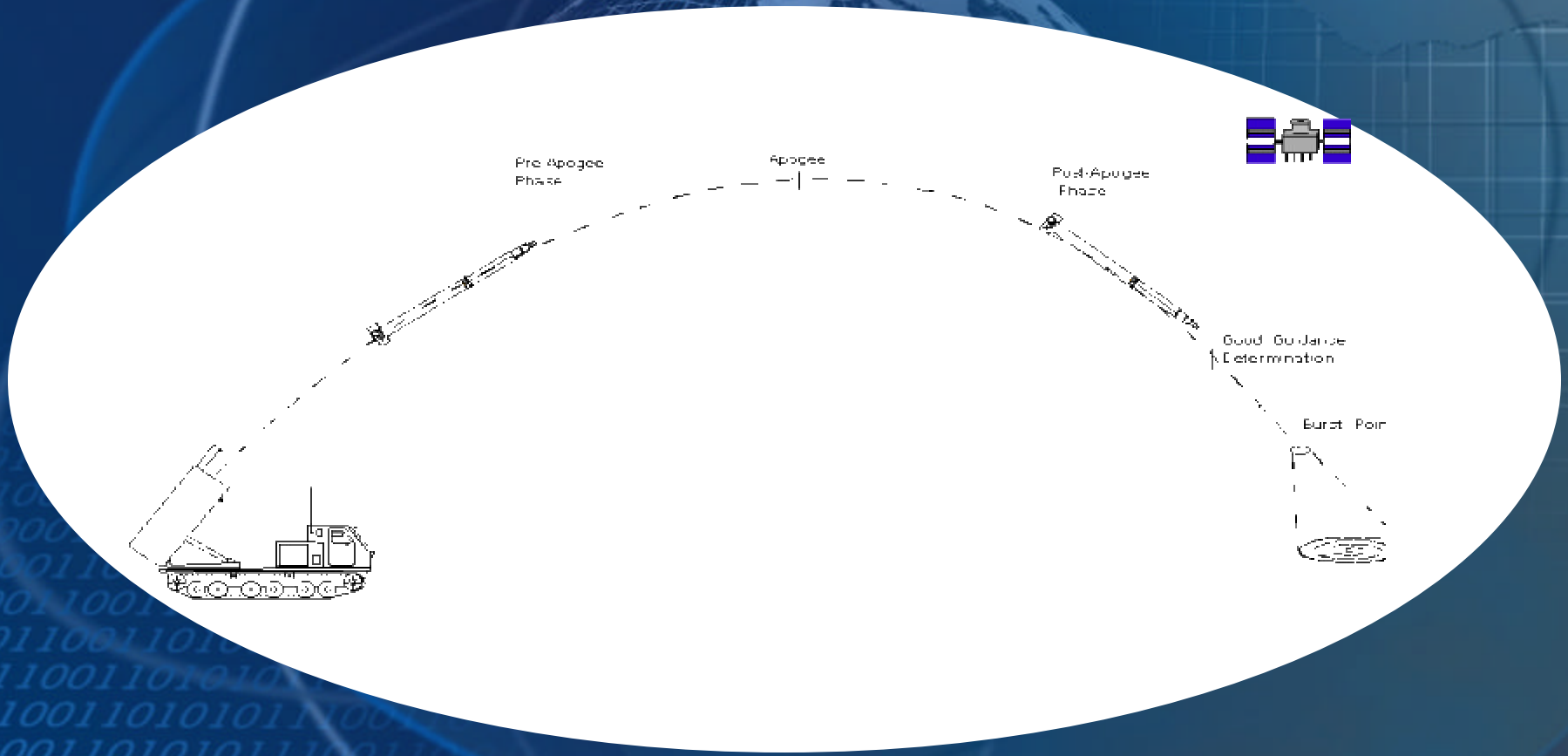
GUIDED MLRS USA AND FOREIGN PARTNERS



KDI PROGRAM TEAM

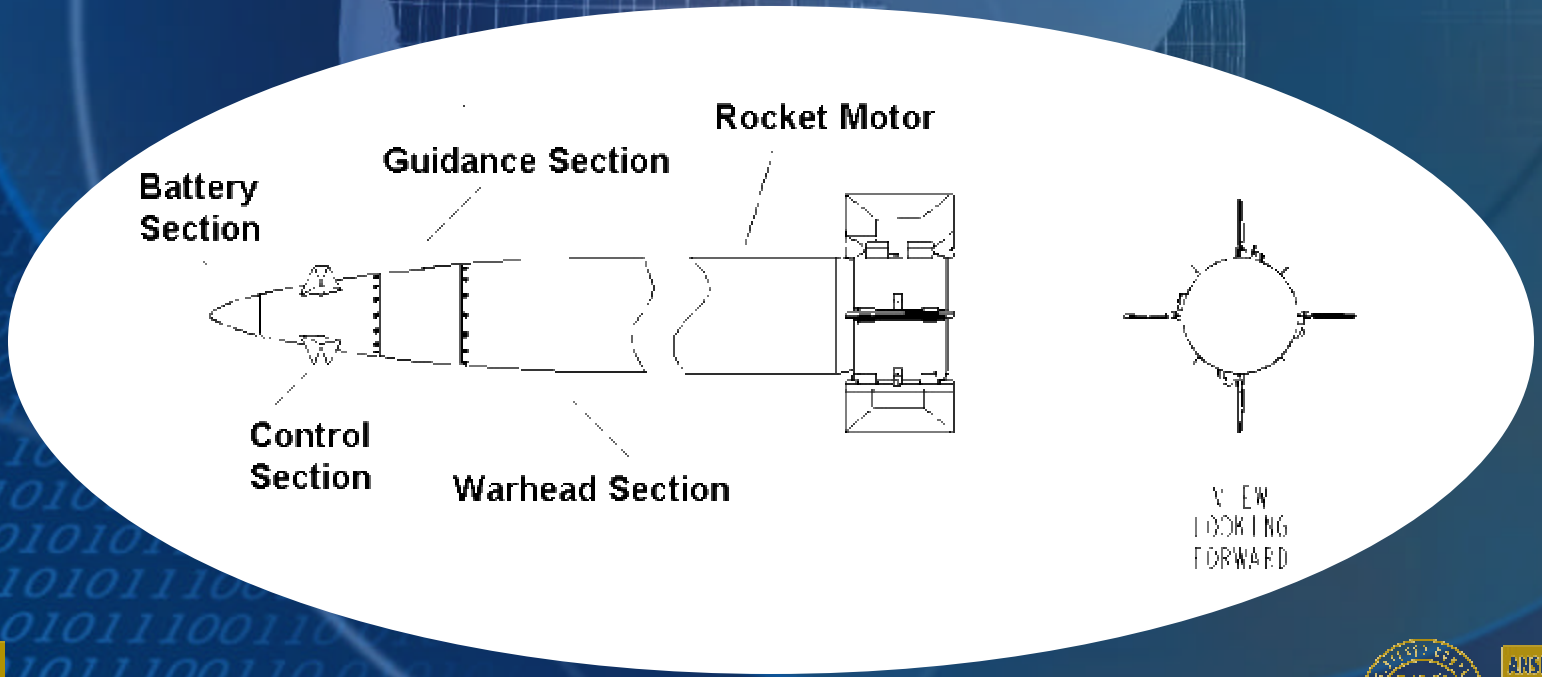
- Mike Buckhanan - Program Manager
- Ted Lewis - Electrical Project Engineer
- Cory Hatch - Electrical Engineer
- Tony Zucker - Mechanical Project Engineer
- Mike Sowder - Test Equipment Electrical Engineer
- Steve Gemperline - Quality Engineer, CQE
- Bob Garrett - Reliability Engineer
- Tom Moore - Manufacturing Engineer
- Bob Butts - Configuration Management

GMLRS OPERATION

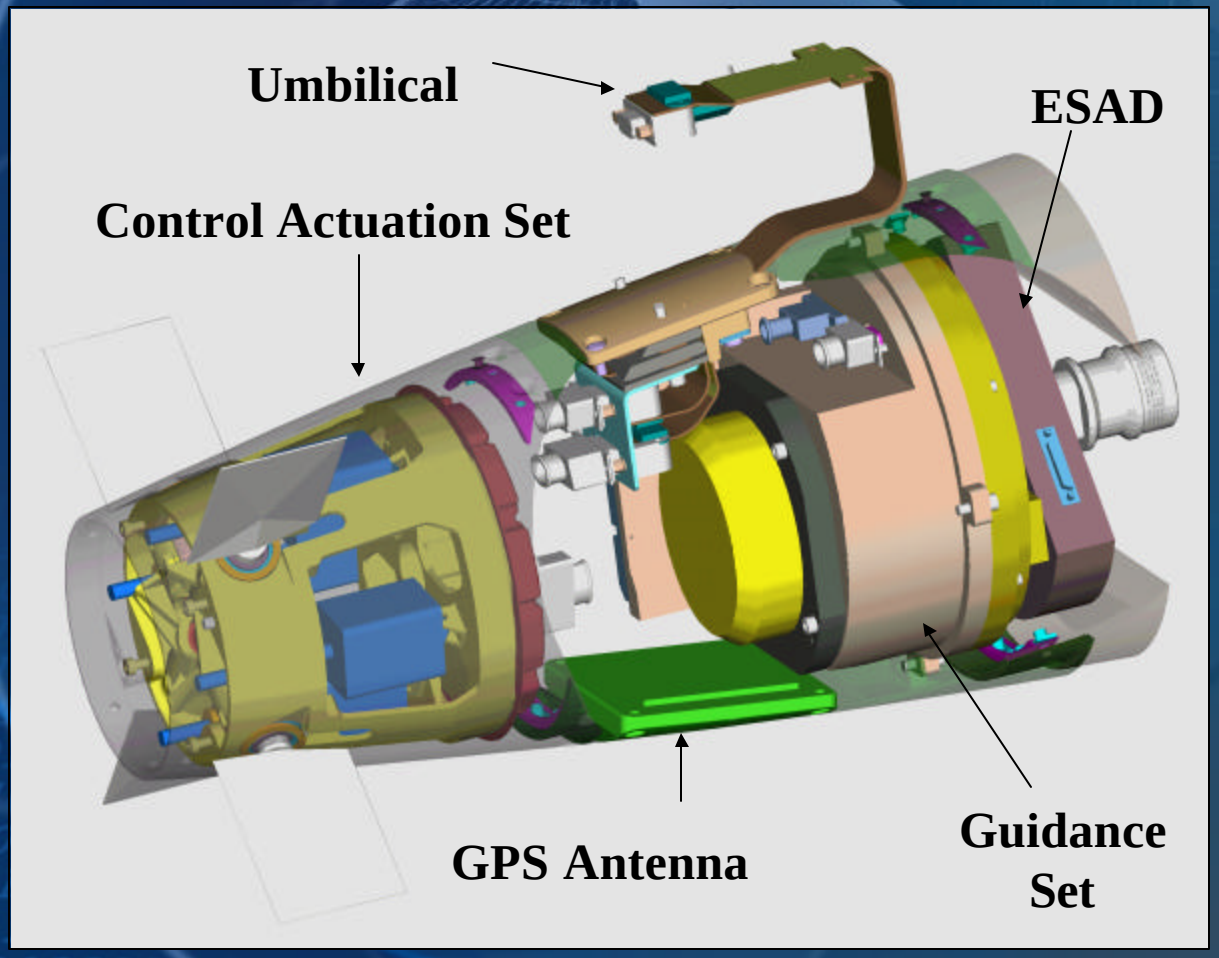


GMLRS ROCKET

- The GMLRS Rocket Is Nominally a Ballistic Round
- The Maximum Off-axis Shot Is 4° Degrees
- The Canards Are Used Only for Trimming the Trajectory During the Flight



GUIDANCE AND CONTROL SECTION



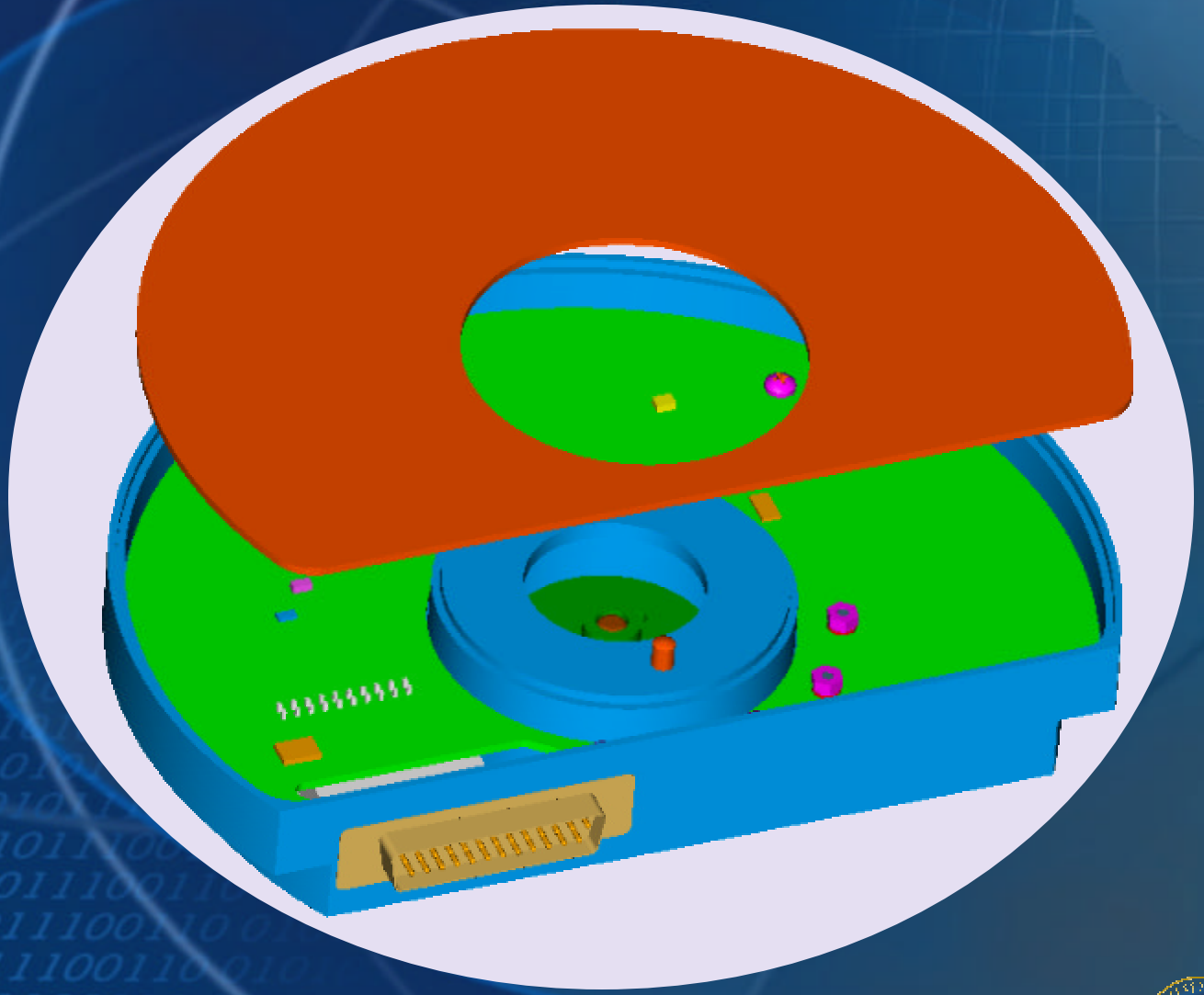
HOUSING

- Material: 304L Stainless Steel
- Function
  - Interfaces to LEEFI Adapter Assembly
  - Interfaces With Rocket
  - Alignment Feature Incorporated
  - Hermetic Environment
  - Supports Printed Wiring Board (PWB)

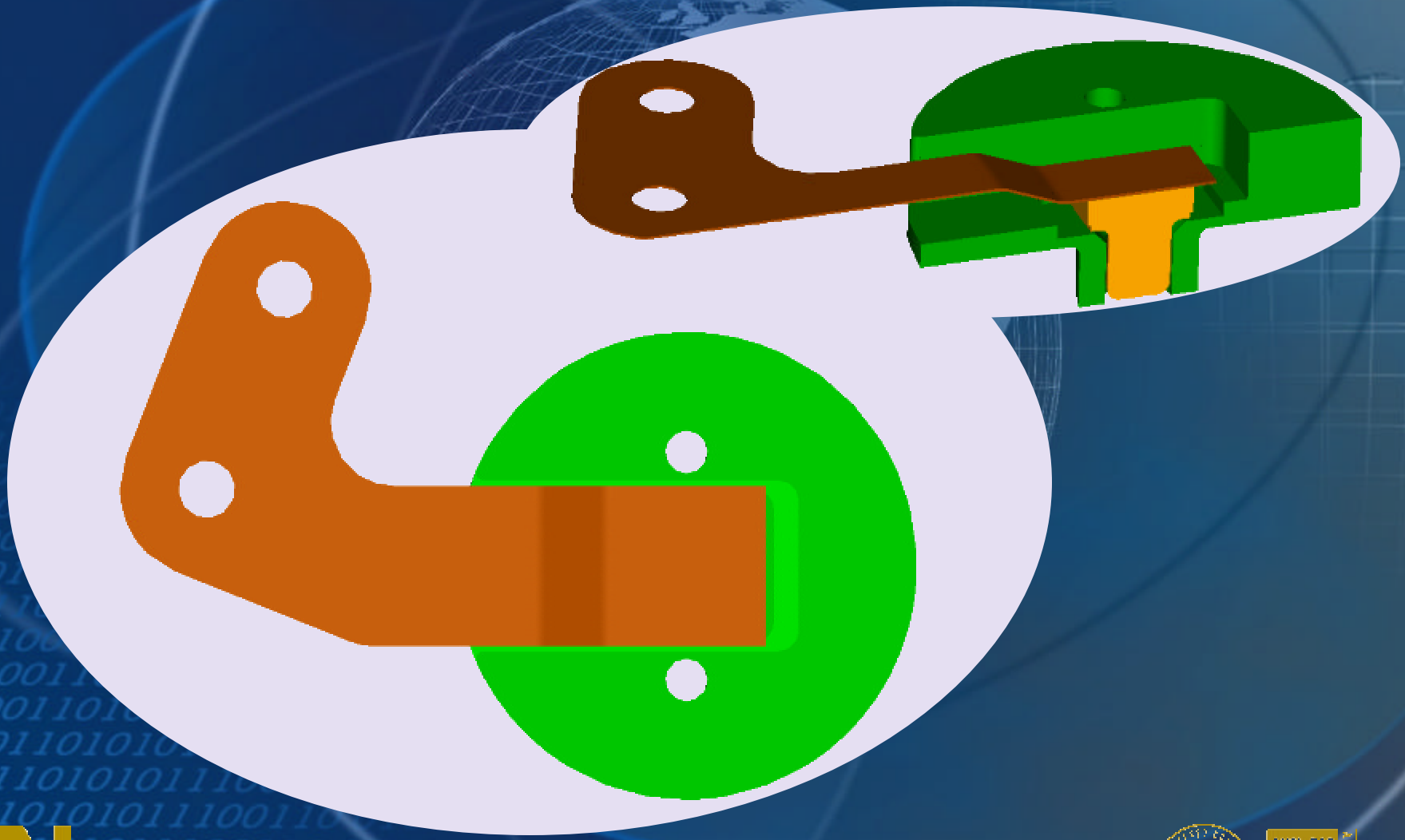
SEALING

- The ESAD Will Be Hermetically Sealed and Tested to Meet a Leak Rate of 1 X 10-6 cc/sec He/Mass Spectrometer at 1 Atmosphere Pressure Differential
- Laser Welding Will Be Used to Seal the Housing, Similar to the Other Qualified Programs at KDI
- The GMLRS ESAD Will Be Back-filled With Nitrogen With A Trace Of Helium Through A Fill Plug

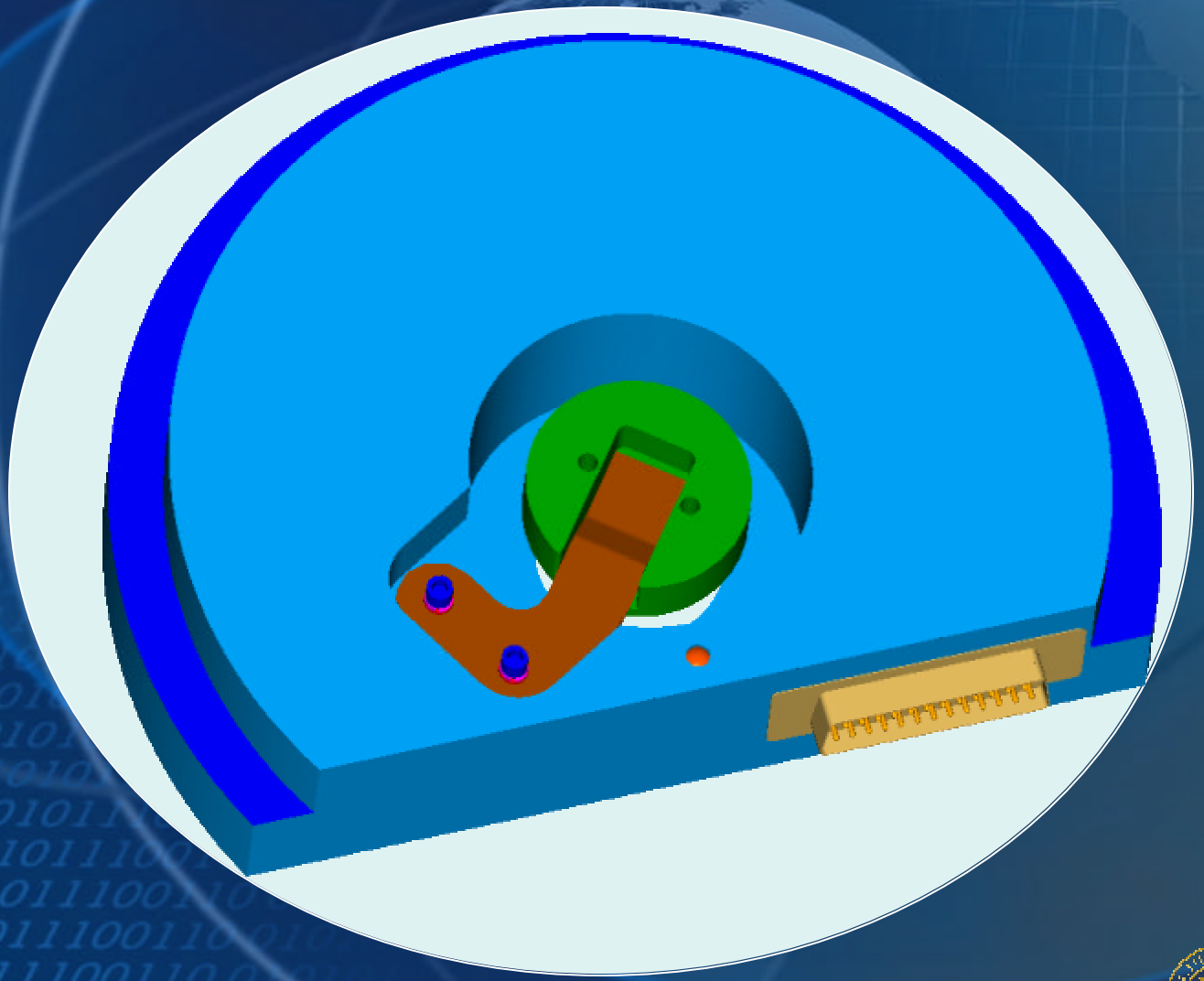
EXPLODED VIEW



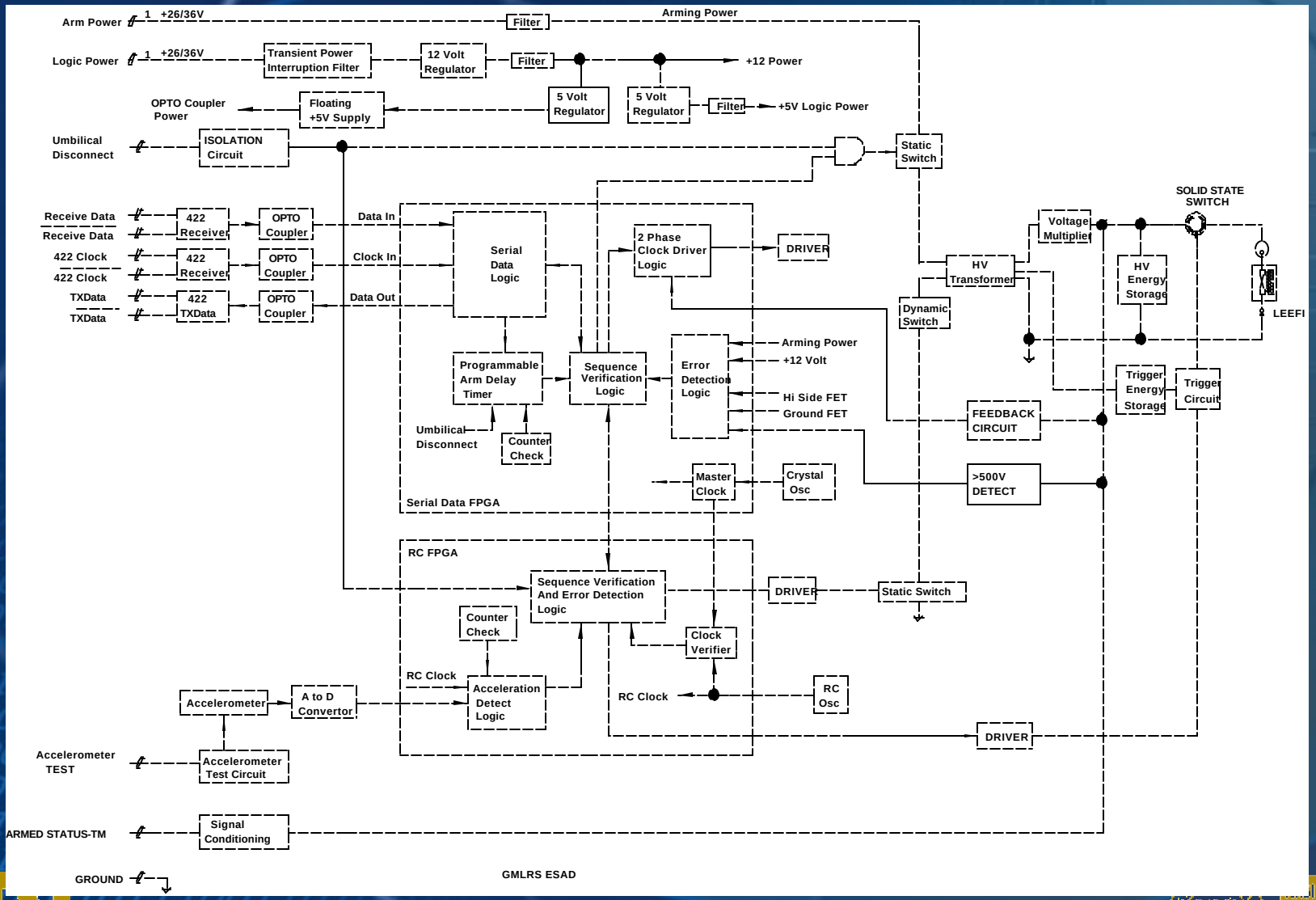
LEEFI ADAPTER ASSEMBLY



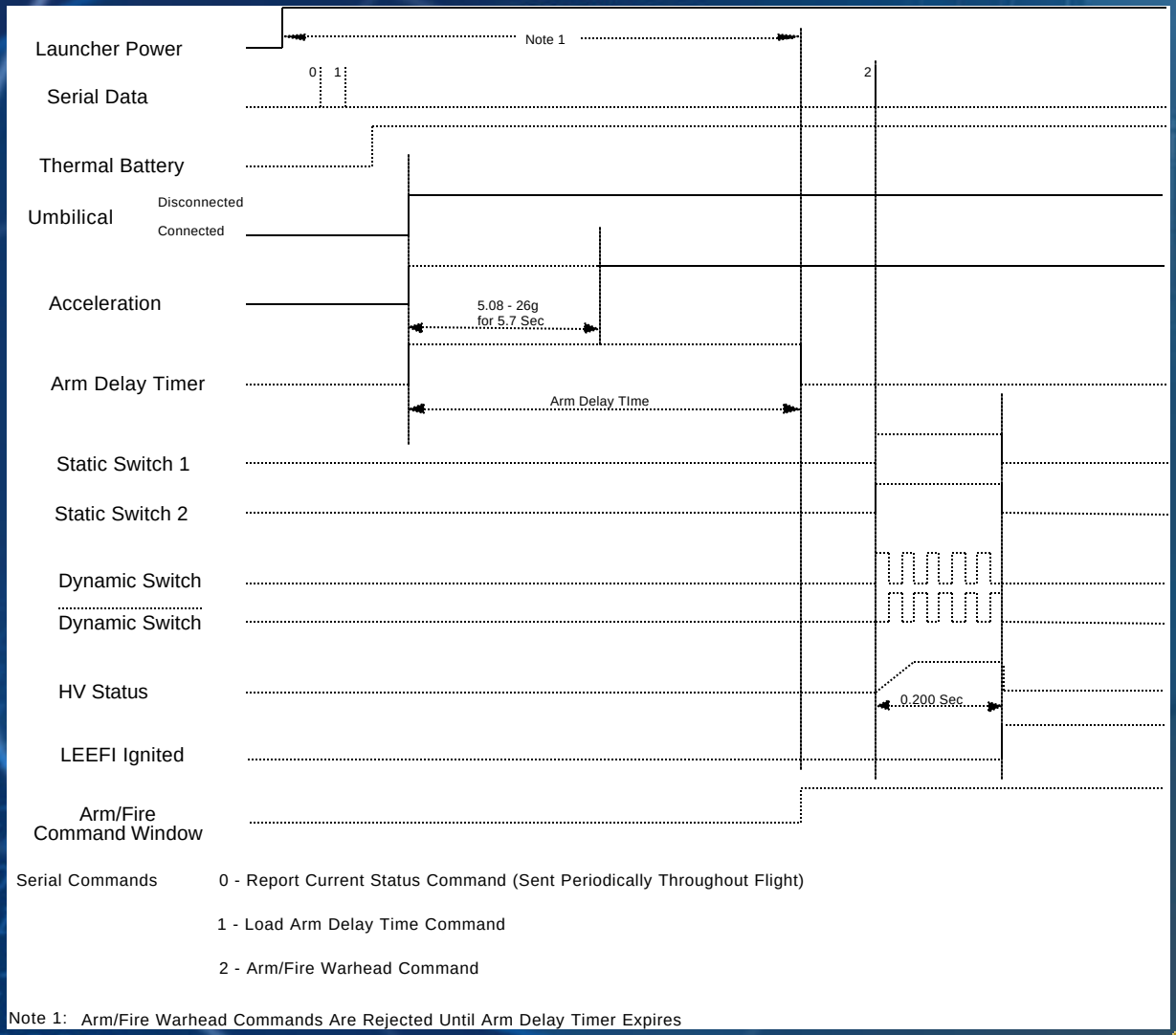
GMLRS ESAD WITH LEEFI ADAPTER ASSEMBLY



DETAILED BLOCK DIAGRAM



TIMING DIAGRAM



Serial Commands

0 - Report Current Status Command (Sent Periodically Throughout Flight)

1 - Load Arm Delay Time Command

2 - Arm/Fire Warhead Command

Note 1: Arm/Fire Warhead Commands Are Rejected Until Arm Delay Timer Expires

SERIAL INTERFACE

- 442 Drivers/Receivers
- SDLC Message Formats

Guidance to ESAD Message

48 BITS

- 8 BIT Start Word
- 8 BIT Command Word
- 8 BIT Delay Time
- 16 BIT CRC
- 8 BIT Stop Word

ESAD to Guidance Message

64 BITS

- 8 BIT Start Word
- 20 BIT Command Word
- 4 BIT Delay Time
- 8 BIT Timer Status
- 16 BIT CRC
- 8 BIT Stop Word

ACCELERATION PROCESSING

- Motorola MMA1201P Analog Accelerometer
  - ± 40g Capacitive, Micromachined Accelerometer
  - Output Sensitivity = 50 ± 2.5 mV/g
- Accelerometer Readings Are Taken Every 340µS
- Accelerometer Output Level Checked During BIT
- Accelerometer Output Level "Nulled" When Battery Power is Applied
- Specification Requirements:
  - 1st Motion = 5.08g for 6 msec Within 0.5s From Umbilical Disconnect
  - Safe Separation = 5.08g for 5.7 ± 0.1 Seconds

LEEFI ASSEMBLY

- Designed in Unison by China Lake, Reynolds Systems and Silicon Designs
- The LEEFI Has Been Qualified by China Lake IAW MIL-STD-331, Test G1
- Specific Tests Designed to Demonstrate the Initiator Meets a Reliability of 0.99 at a 95% Confidence Level Were Performed

MCT SEMICONDUCTOR DISCHARGE SWITCH

- N-Type MOS-Controlled Thyristor
- 1400 Volt
- 4ka Surge Current
- Silicon Power Corporation
- Tested in KDI IRAD Program
  - > 20,000 Discharges

PROGRAM STATUS / SCHEDULE

- Initial AFSRB Presentation - Completed 19 Dec 2000
- PDR - Completed 1-2 Feb 2001
- Engineering Tests - 15 Nov 2000 To 31 Mar 2001
- CDR - 27-28 Mar 2001
- Qualification - 30 May 2001 To 17 Jul 2001
- Flight Hardware Delivery 1 June -28 Sept 2001

QUALIFICATION TESTING

- Twenty ESADS Will Be Subjected to Qualification Testing
- The Qualification Test Environments Will Consist Of:
  - Thermal Shock
  - Tactical Vibration
  - Launch Shock
  - High Temperature Operation
  - Low Temperature Operation
  - Acoustic Noise and Flight Simulation
- Electromagnetic Environment